

WE CLAIM:

1 1. An ultrasound system comprising:
2 a scan head having a plurality of ultrasound transducer elements for producing ultrasound
3 beams;
4 a first subset of the plurality of ultrasound transducer elements for producing a first
5 ultrasound beam;
6 a second subset of the plurality of ultrasound transducer elements, that is displaced by
7 more than one transducer element from the first subset, and for producing a second
8 ultrasound beam;
9 a third subset of the plurality of ultrasound transducer elements, that is displaced by more
10 than one transducer element from the second subset, and for producing a third
11 ultrasound beam; and
12 a transmit switch for coupling the plurality of ultrasound transducer elements to a beam
13 transmitter;
14 wherein, the second subset is the only subset of the plurality of ultrasound transducer
15 elements operative between a time the first subset is operative and a time the third
16 subset is operative.

1 2. The system of claim 1, wherein the second subset differs in position from the both the first
2 subset and the third subset by at least fifty percent of the number of transducer elements
3 in the second subset.

1 3. The system of claim 1, wherein the second subset is disjoint with respect to both the first
2 subset and the third subset.

1 4. The system of claim 1, wherein the center of the first subset is displaced from the center of the
2 second subset by a distance greater than or equal to the width of two ultrasound
3 transducer elements in the plurality of ultrasound transducer elements, and the center of
4 the second subset is displaced from the center of the third subset by a distance greater
5 than or equal to the width of two ultrasound transducer elements in the plurality of
6 ultrasound transducer elements.

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- 1 5. The system of claim 1, wherein the second subset overlaps the first and third subsets by
2 amounts less than thirteen percent of the width of the second subset.
- 1 6. The system of claim 1, wherein the second subset overlaps the first and third subsets by
2 amounts less than thirty-four percent of the width of the second subset.
- 1 7. The system of claim 1, wherein the second subset overlaps the first and third subsets by
2 amounts less than eighty-seven percent of the width of the second subset.
- 1 8. The system of claim 1, wherein the transmit switch includes outputs coupled to the plurality of
2 ultrasound transducer elements and inputs coupled to the beam transmitter, the number of
3 inputs being fewer than the number of outputs.
- 1 9. The system of claim 1, wherein the transmit switch includes outputs coupled to the plurality of
2 ultrasound transducer elements and inputs coupled to the beam transmitter, the number of
3 inputs being fewer than the number of outputs and each of the outputs being alternatively
4 coupled to less than eight of the inputs.
- 1 10. The system of claim 1, further including an image scan converter for generating first data
2 using the first subset and generating second data using the second subset, the first data
3 and the second data being used to form an image.
- 1 11. The system of claim 1, further including an image scan converter for generating first data
2 using the first subset and generating second data using the second subset, the first and
3 second data being used to form an image with a resolution independent of the number of
4 ultrasound transducer elements common to the first subset and the second subset.
- 1 12. The system of claim 1, wherein the ultrasound transducer elements included in the second
2 subset are disposed in a linear array.
- 1 13. The system of claim 1, wherein the ultrasound transducer elements included in the second
2 subset are disposed in a curvilinear array.

1 14. The system of claim 1, further comprising computer code for calculating a cross-correlation
2 between first data generated using the first subset and second data generated using the
3 second subset.

1 15. The system of claim 1, further comprising computer code for calculating a cross-correlation
2 between less than fifty percent of first data generated using the first subset and less than
3 fifty percent of second data generated using the second subset.

1 16. The system of claim 1, further comprising computer code for calculating a cross-correlation
2 between less than thirty-four percent of first data generated using the first subset and less
3 then thirty-four percent of second data generated using the second subset.

1 17. An ultrasound imaging method comprising the steps of:

2 directing three consecutive ultrasound beams into a material under investigation, the three

3 ultrasound beams including,

4 a first ultrasound beam,

5 a second ultrasound beam overlapping with the first ultrasound beam by less than

6 eighty-seven percent of the width of the second ultrasound beam, and

7 a third ultrasound beam overlapping with the second ultrasound beam by less than

8 eighty-seven percent of the width of the second ultrasound beam;

9 detecting echoes generated by each of the three consecutive ultrasound beams; and

10 generating two-dimensional echo location data using the detected echoes.

1 18. The method of claim 17, wherein the two-dimensional echo location data is generated using
2 area-forming.

1 19. The method of claim 17, further including a step of generating an image using the two-
2 dimensional echo location data.

1 20. The method of claim 19, wherein the image resolution is independent of overlaps between
2 the first, second, and third ultrasound beams.